

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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|--|--|---------------------------------------|
| Applicant's or agent's file reference PC-2028034 | FOR FURTHER ACTION See Form PCT/IPEA/416 | |
| International application No. PCT/IB2002/000978 | International filing date (day/month/year) 28-03-2002 | Priority date (day/month/year) --- |
| International Patent Classification (IPC) or national classification and IPC G06T 5/00, H04N 1/46 | | |
| Applicant Nokia Corporation et al | | |

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
- a. ☒ (sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:
- ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
- ☐ sheets which supersede earlier sheets which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
- b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |

| | |
|---|--|
| Date of submission of the demand 29-09-2003 | Date of completion of this report 01-07-2004 |
| Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88 | Authorized officer Henrik Eriksson /LR Telephone No. +46 8 782 25 00 |

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/IB2002/000978

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
☐ publication of the international application (under Rule 12.4)
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

☐ the international application as originally filed/furnished

☒ the description:

pages 1-12 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished

pages* _____ as amended (together with any statement) under Article 19

pages* 13-15 received by this Authority on 17-06-2004

pages* _____ received by this Authority on _____

☒ the drawings:

pages 1-3 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing (*specify*): _____
☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing (*specify*): _____
☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/IB2002/000978

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|--------|-------------|-----|
| Novelty (N) | Claims | <u>1-13</u> | YES |
| | Claims | | NO |
| Inventive step (IS) | Claims | <u>1-13</u> | YES |
| | Claims | | NO |
| Industrial applicability (IA) | Claims | <u>1-13</u> | YES |
| | Claims | | NO |

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:

D1: EP 1191783 A2 D3: EP 1120745 A2
D2: EP 1052598 A2 D4: US 5444500 A

Documents D1 and D2, cited as category X in the Search Report, have been reconsidered to define the general state of the art. Documents D3 and D4 also define the general state of the art.

This Examination Report is based upon the amended claims as filed with the letter of 17-06-2004.

Document D1 discloses a system for enhancing the picture quality of images that are displayed on cellular phones. Properties of the display and of the image are determined and a "processing package" converts the image data into a specific data format that corresponds to the characteristics of the display (column 10, lines 1-35; figure 1). Those characteristics include, for example, the type, the resolution and the colour system (column 6, lines 3-14). Further, the characteristics may also include the environmental brightness, which may be measured with a sensor (an instantaneous property).

Document D2 discloses a mobile terminal (10 in figure 1) that obtains images from a server. The mobile terminal in D2 can change the size of the images so that they can be displayed within the display area (abstract).

Document D1 is considered to represent the closest prior art.

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX V

The subject-matter claimed differs from D1 in that the image processing steps are performed after the step of displaying the image on a display. This solves the problem of keeping the displayed image optimised, despite changes in display conditions appearing over time.

Documents D1-D4 do not disclose that difference, and no relevant combination of the cited documents would lead a person skilled in the art to the invention defined in the claims. The invention according to claims 1-13 is thus novel and is considered to involve an inventive step. It is also considered to be industrially applicable.

CLAIMS

1. A method for improving a digital image displayed on a display, comprising:
- 5 - determining an instantaneous property of the display;
- determining a property of the digital image;
- determining parameters for an image processing method at least partly on basis of said instantaneous
- 10 property of the display, and said property of the digital image; and
- processing the digital image by means of said image processing method, while applying said parameters.
- 15
2. A method according to claim 1, wherein all measures are repeated at a repetition rate.
3. A method according to claim 1 or 2, further
- 20 comprising:
- detecting a change in said instantaneous property of the display; and
- repeating said determining and processing measures when a change is detected.
- 25
4. A method according to any one of the preceding claims, wherein said determination of parameters is further based on an operation mode of the display.
- 30
5. A method according to any one of the preceding claims, wherein the digital image is adapted to one display out of a group of displays consisting of reflective and transflective displays.
- 35
6. A method according to any one of the preceding claims, wherein said image processing method comprises at least one sub-method chosen from a group of sub-

methods consisting of saturation increase, color componentwise histogram stretch, and unsharp masking.

7. A mobile device comprising a display unit, an
5 image memory for holding a digital image, and an image improvement unit for improving said digital image displayed on the display unit, said image improvement unit being arranged to process said digital image by means of an image processing method; to determine
10 parameters for said image processing method at least partly on basis of an instantaneous property of the display, and a property of the digital image.

8. A mobile device according to claim 7, said
15 display being one of a reflective and a transfective display.

9. A mobile device according to claim 7 or 8,
wherein said image improvement unit is provided in said
20 display unit.

10. A mobile device according to anyone of claims 7-
9, wherein said image improvement unit is provided
outside of the display unit, and is arranged to
25 communicate therewith.

11. A display unit comprising a display, an image
memory for holding a digital image, and an image
improvement unit for improving said digital image
30 displayed on the display, said image improvement unit being arranged to process said digital image by means of at least one image processing method; to determine parameters for said image processing method at least partly on basis of an instantaneous property of the
35 display, and a property of the digital image.

15

12. Use of an image processing method comprising at least one sub-method chosen from a group of sub-methods consisting of saturation increase, color componentwise histogram stretch, and unsharp masking, for improving an
5 digital image for display in accordance with anyone of claims 1-5.

13. Use of an image processing method comprising at least one sub-method chosen from a group of sub-methods
10 consisting of saturation increase, color componentwise histogram stretch, and unsharp masking, in a mobile device according to anyone of claims 7-9.

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